

## Atmospheric wave structure derived from Mars Global Surveyor Horizon Sensor data

Terry Z. Martin (JPL) and James R. Murphy (NMSU)

The Mars Horizon Sensor Assembly on the MGS orbiter monitors the orientation of the spacecraft relative to the limb by sensing atmospheric emission in the 15 micrometer CO<sub>2</sub> band. These data are used to maintain nadir pointing for the remote sensing instrument suite. The fields of view normally straddle the limb in four directions: forward and aft along the spacecraft's polar orbital path, and to both sides.

As an engineering device, the MHSA benefits from Mars' atmosphere being spatially bland at 15 micrometers. However, the derived radiance data carry information about the thermal state of the atmosphere, which is subject to diurnal, seasonal, latitudinal, and dust storm related variations, as well as wave phenomena. The Mariner 7 IRS, Mariner 9 IRIS, and Viking IRTM all demonstrated such variability.

The MHSA has now been monitoring global atmospheric thermal behavior continuously for nearly two Martian years since the start of the mission's mapping phase in May 1999. The Horizon Science Experiment (HORSE) is intended to glean new insight into atmospheric variation from the MGS horizon sensors, whose data flow continuously to the Earth in the engineering stream, and whose spatial coverage builds at a rapid rate.

Analysis of the data from this sensor (temperatures at four to six Mars local times with good spatial coverage) does permit isolation of high-frequency tidal components that are not available from lesser diurnal coverage provided by nadir views only. Analysis of GCM column temperature results provides a tool by which observed temperatures can be interpreted. This is especially true when wavenumber:frequency deconstructions are performed on data obtained with less-than-desired spatial coverage or temporal frequency. In such situations, analysis of model results at a variety of samplings (complete, time-of-day limited, etc.) allows for comparison of the fidelity with which various wave features 'pass' through the sampling and analyses.